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Junior Conservation Camp introduces out-of-doors

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Cover Photo: Campers fishing; 1982 Junior Conservation Camp

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Commissioner
Stanley J. Pac

Director Info & Ed
William Delaney

Editor
Margot Callahan

Graphics
Rosemary Gutbrod

Composition
Caryn Alleva

Circulation
Helen Moriarty 566-5524

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Is that shellfish safe to eat?

Illustrations: Malcolm Shute

*By Malcolm Shute, Principal Environmental Sanitarian,
Bureau of Health Promotion and Disease Prevention,
Department of Health Services*

Individuals will look at an ice cold, glistening, succulent raw oyster and devour it with delight. Once the individual has reached the point of popping the delectable little morsel into his mouth, it becomes very difficult to convince him that he should not eat it, even though the shellfish was taken from a closed shellfishing area. Herein lie some of the problems associated with the consumption of shellfish. They are usually eaten raw or only partially cooked (as in steaming), and the whole organism, exclusive of the shell, is devoured. Further, some people believe you can tell contaminated shellfish by the number of white spots on the meat. In fact, you cannot. You must rely on the proper classification of the areas where the shellfish are growing.

The Department of Health Services's concern for the proper classification of areas where shellfish are growing is the result of the shellfish's biological makeup. Shellfish (oysters, clams, and mussels), unlike lobster, crabs, conch, or finfish, filter and concentrate their food from the surrounding waters. Their food consists of microscopic plants, animals, and organic matter including bacteria and viruses. When the water temperature is above 40 degrees Fahrenheit, oysters can filter 200 to 300 gallons of water per day. An individual consuming shellfish, unlike a swimmer accidentally gulping a mouthful of water, is taking in a concentration of bacteria and other substances equal to amounts diluted in hundreds of gallons of water. Connecticut "open" shellfishing areas do not pose a health hazard to consumers, but "closed" shellfishing areas present a definite health hazard.

Shellfish growing in contaminated areas can concentrate disease organisms that could result in illness if eaten. Not only can we contract diseases from sewage-contaminated shellfish, but we can also transmit diseases such as hepatitis to family members and close friends. For this reason, the Department of Health Services describes certain areas as "closed" to shellfishing. Scallops are also filter feeders, but their harvesting has not been restricted because people normally consume only the cooked muscle, and not the gut which harbors the disease organisms. Similarly, the closures do not apply to finfish, lobster, or crabs. Areas closed to shellfishing do not affect swimming or other recreational activi-

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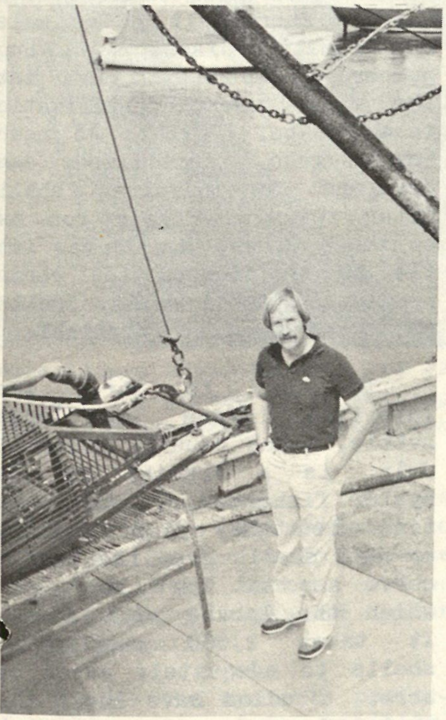
If your oysters hum "Yankee Doodle," State's Aquaculture Division may have played a part

By Kirsten Engel, Environmental Intern



Kirsten Engel photos

On board "The Ellen J": John Volk, chief of the Aquaculture Division, poses with a clam dredge.

Next time you finish off a big seafood dinner, think twice before you toast the fertile waters of the Chesapeake Bay. Chances are the oysters, clams, and scallops you found so tasty were caught a lot closer to home -- maybe within a stone's throw of the Connecticut shore. Most seafood lovers indulge unaware that Connecticut leads the country as the most intensely shellfished area per acre of shoreline. The State Department of Agriculture's Aquaculture Division administers the cultivation of over 41,000 acres of shellfish grounds, most of it leased to the multimillion dollar oyster industry.

So if the oysters on your plate begin to hum "Yankee Doodle" in five-part harmony, consider yourself lucky. Seafood connoisseurs rank Connecticut's oysters among the finest in the world.

In a nut shell, shellfish cultivation for commercial companies is the mass production of extremely sensitive marine animals in a constantly fluctuating environment. Separate businesses may handle different stages in the growing process: the seeding, cultivation, maintenance, and harvesting of a given crop.

The State agencies involved have their own division of labor. The Aquaculture Division of the Connecticut Department of Agriculture administers the leasing of private and State-owned shellfish grounds as well as of many of the beds owned by coastal townships. The Environmental Health section of the Department of Health Services monitors the licensing of every shellfishing operation and the inspection of all shellfish crops sold on the open market.

Despite a recent revival of the industry, shellfishing companies lag far behind their output in the late 19th century. The peak of the industry occurred in the 1880s, when more than 87,000 acres of shellfish beds were under active cultivation in Connecticut. This is double the acreage now being utilized. The per capita consumption of oysters, not surprisingly, was three pounds per year in 1880. Today Americans consume an average of two pounds apiece of all shell and fin fish each year.

The decline of the industry in the early part of this century was the result of numerous factors. "In addition to the outbreak of water-borne diseases which gave the shellfish industry bad press, there were problems with pollution, over-harvesting, and predators," said John Volk, Chief of the Aquaculture Division in Milford. The low point came in 1938, the year of a terrific hurricane which destroyed thousands of shellfish beds by burying the animals under a suffocating layer of silt. The recent upswing in shellfish production can be traced to pollution control efforts and intensive reinvestment on the part of a significant number of shellfish companies.

A large portion of this reinvestment has gone into the harvesting of Crassostrea virginica, the common American oyster, whose harvest is the most lucrative and predictable of all the shellfish. Connecticut oysters have long been known for their ability to stay fresh for long periods of time, causing them to fetch at least $10 more per bushel wholesale than their Chesapeake Bay counterparts.

The comeback of the oyster has been accompanied by an increase in clam, scallop, conch, and mussel populations which also thrive in cleaner waters. While oysters, clams and, to a small degree, scallops and conchs, are harvested commercially, mussels and most conchs are reserved for the recreational fishermen. We will explore some of the history of the shellfishing business and how private companies and public agencies are working together to maintain a healthy shellfishing industry. But before we do, a little information on the shelled creatures themselves might be useful.

Together with clams and scallops, oysters are pelecypods, members of a class of bivalve mollusks without a distinct head. This characteristic distinguishes them from other mollusks such as snails and slugs. The soft unsegmented bodies of the bivalves are protected by a calcareous external shell consisting of two halves, referred to as valves, hinged together like swinging doors. The oldest, or first-formed, part of the shell is known as the umbo, and it is from this point that the concentric lines of growth can be seen to extend towards the outer edges of the shell. The valves open and close through the use of adductor muscles attached at points along the interior surface of both valves.

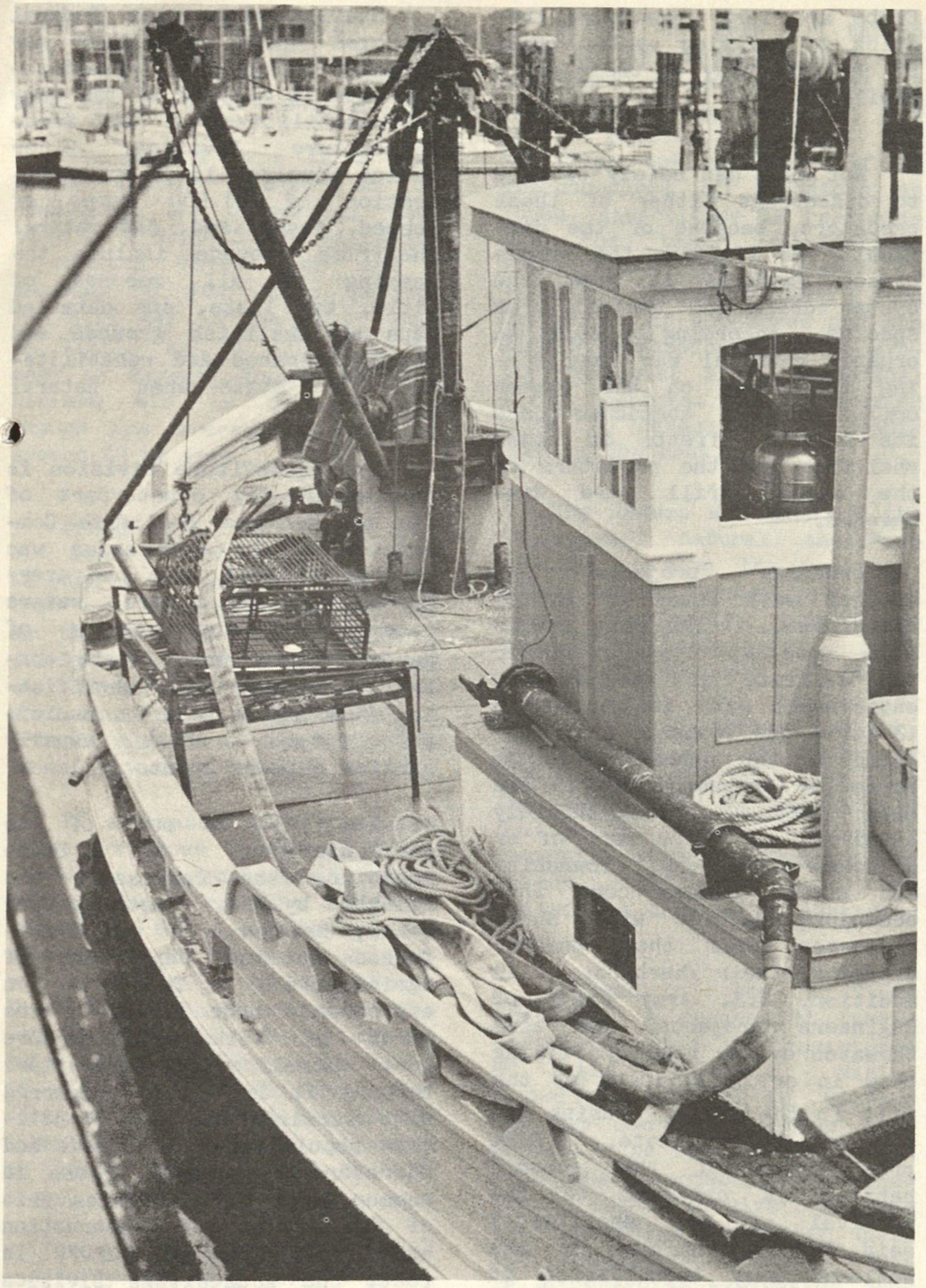
Most bivalves feed on organic particles and microorganisms suspended in the water. The microscopic plankton is caught by mucus on the animal's gills and eventually carried to the mouth by rows of beating cilia.

Bivalves have different lifestyles which the shellfisher must consider to reap a profitable harvest. The oyster may float free for a short period in the larval stage, but most of its life is spent cemented to a hard surface beneath the sea. The same is true of Mytilus, the sea mussel. The hard clam, or quahog, Mercenaria mercenaria, is a soft-bottom burrower, on the other hand, inhabiting soft pockets of sand, mud, and debris between intertidal rocks. Scallops, Pecten irradians, are a little harder to keep track of. While they may attach themselves to rocks like mussels and oysters, they are mostly free-swimming animals, propelling themselves through the water by pumping their valves open and shut.

Depending upon where they live, how they move, and what they eat, bivalves have developed certain physiological traits. For example, clams are equipped with a "foot" (really a large retractable muscle) for digging and two siphons, or tubes, for breathing beneath the mud surface. One siphon is used to inhale water, the other to exhale it. Oysters secrete a cement that attaches their shells permanently to hard surfaces, whereas mussels can attach themselves temporarily by secreting a "byssus" of threads from a gland in their foot. Scallops have developed a very large adductor muscle [illegible] propel themselves through the water, and, incidentally, this muscle is the only part of the scallop that we eat.

Perhaps most crucial to a commercial shellfisherman is an understanding of the bivalve's life cycle. If the fisherman knows when the bivalve spawns and what conditions are needed to ensure the survival of as many larvae as possible, he is guaranteed a better chance to reap a larger crop of shellfish. The heaviest oyster spawn occurs during the months of July and August or when the water temperature reaches 68-70 degrees Fahrenheit. The males and females discharge a huge number of sperm and ova into the water where fertilization takes place. Within 48 hours the zygote (fertilized egg) develops a bivalve shell. After swimming freely for two to three weeks, the larvae settle to the bottom and permanently attach to rocks, shells, or any hard surface available.

The two to three week interlude before the larvae settle, which usually occurs in July, is a crucial one for oyster fishermen. This is the time when they plant "cultch" or dump shells over the beds to serve as that hard surface to which the larvae will attach. It takes 2,000 bushels of shells to adequately cover one acre. Studies have shown that oyster larvae prefer shells to any other hard surface. When to plant the cultch is one of the oyster fisherman's most important decisions. If he plants too late, he may miss the settling phase, leaving thousands of larvae to drift



Aquaculture Division uses its 22-foot oyster dredge "The Ellen J." (1902), for survey work, setting buoys, collecting samples, inspecting for predators, and shellfish bed rehabilitation.

out with the tide. On the other hand, he doesn't want to plant cultch too early because the shells may become covered with slippery algae or other marine animals.

Due to the oyster's preference for areas of low salinity, only certain portions of the coast are naturally-producing oyster beds. In Connecticut some of these beds are under private lease, but most of them remain under permanent State control and may be harvested by anyone with a permit from the Health Department. An oyster fisherman who is leasing grounds that are not naturally-producing will either obtain a permit to harvest State-owned natural beds himself or hire one of the several individuals who make it their business to harvest only State natural beds. Fifty to 90 individuals annually acquire permits to harvest seed oysters from State beds using hand implements.

The oyster seed or "spats," both terms that refer to young attached oysters, are transferred to private beds where they complete their growth. Once harvested from a State-owned natural bed, oysters and clams take an average of four to five years to reach commercial size. Shellfishermen can control this growth rate, if they wish, by simply transferring their crop to deeper waters. By retarding the shellfish's growth in this manner, the fishermen can protect themselves against flooding the seafood market and thus lowering their profits.

Theoretically, at least, this is a rough synopsis of the life of a commercial shellfish. But things don't always run so smoothly. A given crop may be threatened by a host of unwelcome factors including natural predators and human disturbance.

Starfish, the common Asterias forbesi and occasionally some Asterias vulgaris, are the shellfish's major predator and the most difficult to get rid of. Starfish feed on mollusks, crustaceans, tube worms, and other invertebrates. In order to entice the bivalve out of its protective covering, the starfish will either lie over its prey, waiting for it to voluntarily open its shell or will grip the opposite valves with the suction cups that line the undersurface of its arms and gradually pull them apart. A starfish has a maximum pull of 1,300 grams compared with a 900 gram resistance by the adductor muscles of bivalves.

Once the starfish opens the shell just one millimeter, it's got a meal. All it has to do now is squeeze its everted stomach through the opening. The stomach secretes enzymes which begin to digest the shellfish in its shell. Starfish and shellfish are a lot like camels and water; the starfish may feed voraciously but can also go for long periods of time without food. One month-old starfish in an aquarium devoured over 50 young clams in six days.

Starfish have a further advantage over oysters besides strength: their birthdays. Starfish spawn just weeks before oysters, so they're in a perfect position to prey on the oyster larvae. Because of starfish predation, the mortality rate among oyster larvae is extremely high. "Out of a million larvae, only 250 survive long enough to settle. And of these 250, perhaps 99 percent will be eaten in the first year," said Chief of the Aquaculture Division, John Volk.

A while ago fishermen would dredge the starfish, tear them in two, and throw them back into the sea -- not realizing that the starfish is able to regenerate lost arms. Today shellfishermen use two methods of starfish control: mopping and spreading of lime. Mopping is exactly that, the dragging of huge mops over starfish-infested oyster beds. The starfish entangled in the yarn are plunged into vats of hot water on board the ship's deck and are killed instantly.

The alternative is to spread a layer of calcium oxide (a granular form of lime) over the oyster beds. Calcium oxide reacts with water to produce heat and kills the starfish by burning off its outer tissue. Despite the sound of the procedure, Malcolm Shute, Principal Sanitarian for the Department of Health Service's Environmental Health Section, said the non-toxic chemical threatens neither the public nor the sea.

Oysters would also be advised to stay away from oyster drills, and the snail Urosalpinx cinereus, and all crabs. The oyster drill may be only 25 millimeters long but has been known to cause considerable damage to an oyster crop. The snail kills its victims by boring a hole through the shell with the secretion of abrasive enzymes and the use of its radula, a protrudable organ bearing teeth. It then squeezes an extension of its mouth through the hole to devour the animal. Crabs are less ingenious; they stick to bullying oyster spats by chipping away at their small shells.

Not much can safely be done to discourage either of these predators, because of the difficulty in limiting the eradication measures to just the oyster drill and certain crab species. According to Volk, an organic chemical was used during the 1960s on the oyster drill but was abandoned once its harmful effects on other shellfish and the predators of the oyster drill were discovered.

Dredging projects are another main cause of oyster disturbance. Like many shellfish species, oysters prefer the salinity of the estuary environment with its estimated 15 parts per thousand salt compared to the approximately 35 parts per thousand salt in the open ocean. Unfortunately estuaries are often part of or adjacent to harbors. Townships and marina owners come into constant conflict with shell fishermen when they propose dredging their harbors. In addition, U.S. Army Corps of Engineers projects can also threaten oyster beds by filling them in or by building up the silt in the water, causing the oysters to suffocate. "The preservation of the estuary habitat is critical to the survival of the shellfish," said Volk. "So much of the wetlands have been filled in it's unbelievable. We do whatever we can to preserve wetlands and keep up water quality, but just one toxic spill can devastate the entire shellfishing industry."

The Aquaculture Division tries to work cooperatively with the Army Corps of Engineers and townships to help them avoid these conflicts. Before proceeding with a flood control project the Army must first ask the Aquaculture Division for comments. The right to comment, however, doesn't grant the power to stop a project destructive to shellfishing.

Dealing with other federal agencies whose activities may endanger commercial shellfishing beds is another of the many responsibilities of the State Aquaculture Division. Other duties involved in the administration of 41,000 acres of leased, franchised, and natural shellfish grounds include the keeping of all records of title, tax lists, and detailed maps of shellfish grounds and the maintenance and rehabilitation of state-owned natural beds.

The Aquaculture Division is the modern-day counterpart of the now defunct Shellfish Commission. The Commission was created in 1881 when the overharvesting of shore waters necessitated the opening of deeper waters under State control. Before that, shellfishing took place only in municipal waters, which usually stretch between points of land.

In 1971, as part of the reorganization of State agencies, the Commission was absorbed by DEP. Just one year later, however, it was transferred to the Department of Agriculture. This is an appropriate home since, in the words of Volk, "Aquaculture lent itself to Agriculture because it is really concerned with farming the sea. Shellfish populations don't move and therefore have very little in common with the Fisheries Unit of the Divison of Conservation and Preservation in DEP." In fact, the Aquaculture Division is pretty self-sufficient and probably works more extensively with the Department of Health Services than it does with the rest of the Department of Agriculture.

Aquaculture's job may be said to start with an application from an individual or business to lease a plot of land in State waters. There are three types of shellfish grounds a shellfisherman may apply for. The first is a permit to harvest shellfish from State-owned natural beds. Aquaculture issued 71 personal licenses and 53 boat licenses for this purpose during 1981.

Permits must be obtained from the Health Department if the individual wishes to harvest seed oysters from these beds.

The second type is a personal lease, issued to an individual or commercial company on a competitive basis for a minimum three year and a maximum 10 year time period. The plot may be any size, from as little as 20 acres to as many as several thousand. The minimum bid is $1 an acre though the average is usually around $3 an acre.

Franchises, the third type of lease, are passed down through a company and companies that own franchises pay a tax on the acreage rather than a yearly rent. By a decision of the Shellfish Commission, no new franchises are available. Grounds may be obtained through lease only.

If a leasee is interested in waters close to shore, he or she would, in most cases, apply for a lease from the adjacent township. For a bed beyond the boundaries of township waters, one must apply to the State Aquaculture Division for the lease. There are exceptions to this rule, however. The towns of New Haven, Milford, and Westport have handed the administration of shellfish licenses on their waters over to the State.

Once a bid has been successfully placed, for a small fee the Aquaculture Division will mark the area for the leasee with buoys. A part-time staff engineer determines the proper place for the buoys through a technique known as triangulation. This means the engineer will use three landmarks and, with the help of a sextant, fix the buoy at the intersection of two imaginary lines radiating out from the landmarks. Due to a lack of natural landmarks, Aquaculture has placed many of their own -- usually stiff poles -- at various points along the shore. The Shellfish, a 65 foot research vessel built in 1932, is used for this purpose.

Before an area is turned over to the leasee, Aquaculture completes a routine check of the beds to see that they are in a healthy condition for shellfish cultivation. If an overabundance of predators is found, Aquaculture is responsible for their elimination. Volk, who holds a degree in Aquatic Biology from the University of New Haven and has worked professionally with oyster companies as a commerical diver, performs the underwater study to determine the condition of the beds.

The upkeep and care of the State-owned natural shellfish grounds is also the responsibility of the Aquaculture Division. Basically, Aquaculture acts like a commercial company in the maintenance of State-owned beds -- controlling predators, spreading cultch, and checking for pollutants or high levels of silt. Last year the beds were so intensively cultivated by commerical companies who spread their own cultch that the State was spared the trouble of spreading any.

Instead, the State instituted a program of larvae evaluation with the assistance of the National Marine Fisheries Service in Milford and two commercial oyster companies. The operation involves both the microscopic examination of other bivalve organisms that settle on the oyster shell and the oyster larvae. "This is an on-going evaluation program," explained Volk. "It's designed to tell us how productive the spawning season is each year and which areas were more or less productive." Some fluctuation in productivity is to be expected. "Like all natural organisms, oysters go through highs and lows. But as long as we keep the water quality up we should be able to keep the population high," he added.

Volk says that they have had "a bit of a problem with poaching," though it does not compare to the problems the DEP Fisheries Unit has had with lobster poachers. For this reason the Aquaculture Division issues police badges to town shellfish police forces.

Environmental Health Services of DHS works closely with the Aquaculture Division to prevent the marketing of contaminated shellfish. The Health Department issues two types of licenses: a certificate for the harvesting of shellfish in open waters and their distribution within the State and a permit to take shellfish out of areas closed because of pollution.

The transfer of shellfish from polluted areas to clean waters may sound extremely risky. Actually, the entire process, called depuration, is quite safe. Shellfish pump such enormous amounts of water through their systems daily in order to catch enough microscopic organisms to stay alive that chemicals and bacteria that they may have absorbed in a polluted environment are expelled in a matter of days.

An adult oyster, said Volk, pumps as many as 100 gallons of water through its system daily. But just to be safe, the State has made a law that shellfish must live in clean water for 14 consecutive days before they may be removed. This is if the water temperature is over 50 degrees Fahrenheit. At lower temperatures the waiting period is somewhat longer due to the shellfish's slower rate of metabolism in colder water. "The shellfish may not be harvested until the company receives a certificate from us," said Shute.

Recently Dr. Sun Feng of the University of Connecticut's Marine Sciences Department and Lance Stewart of the Marine Advisory Services, both working at Avery Point in Groton, have been researching the depuration process in the hope that some day it will be possible to construct a depuration plant. Such a facility would speed up the process by placing the shellfish in fast-circulating sterilized water. Shellfish could be transported to the plant directly from polluted waters.

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Oystering has changed little since 1800s

By Kirsten Engel, Environmental Intern

> The City Island Oysterman, therefore, began to save his shells from the lime-kiln and the road-master, and to spread them on the bottom of the bay, hoping to save some of the oyster-spawn with which his imagination densely crowded the sea-water.
>
> --Ernest Ingersoll, The Oyster Industry: Tenth Census of the United States

Kirsten Engel photos

Scott Barnes, biologist for Long Island Oyster Farms, Inc., takes water samples in the Quinnipiac River.

The founding of the Northeastern oyster industry predates the founding of our country by at least a century, to when the Indians first showed the colonists where the oysters grew in abundance. The first oystermen were fishermen and watermen who began to specialize in the gathering of oysters from naturally producing beds. After the near destruction of the entire industry by overharvesting in the early 1800s, oyster fishermen gained an understanding of the limits to a natural population's ability to renew itself, knowledge that transformed the industry from one of exploitation to one of cultivation.

Yet since this switch the industry has changed very little. Stepping into the industry now is like boarding a time machine that got stuck. Modern methods of aquaculture are used to complement, rather than replace, traditional farming techniques. The tide of change has been stemmed, perhaps, by the unchanging nature of the oysters themselves. Northeastern oysters still spawn between June and August, still attach themselves to other shells on the ocean floor, still taste the same as they did over 200 years ago. And for many of those involved in the industry, oystering is still largely the same way of life.

Once they removed the brooders, or adult oysters, from the beds, early oyster fishermen seldom bothered to return the shells to the sea. Lacking a natural attachment surface for the larvae, oysters

Deckhand Ted Gourd mops for starfish aboard "The Mascot," a star boat of Long Island Oyster Farms.

started to become scarce in the early 1800s. In his historical account of the Northeastern industry, Oystering from New York to Boston (Wesleyan University Press, Middletown, CT 1974), John Kochiss comments, "The oyster was beating the buffalo to extinction."

As early as 1679, New England states recognized the necessity of monitoring the industry in order to prevent the oyster's extinction in the surrounding waters. Many Connecticut townships began regulating the yearly oyster take with the encouragement of the State legislature. A New Haven law, for example, prohibited oyster fishing during the spawning months of May through August. By the early decades of the 19th century many fishermen began to practice a simple method of maintaining an oyster reserve by transplanting baby oysters to underwater lots until they reached maturity.

But it wasn't until roughly the 1860s, when fishermen began to truly cultivate their oysters, that the industry was (for a while anyway) safely out of danger and the migration of Northeastern oyster companies South to the Chesapeake Bay halted. The near extinction of the oyster population had caused many Connecticut companies to either import oysters from the Chesapeake or to move south. With cultivation, however, Connecticut developed into the leading oyster seed producer north of New Jersey.

Cultivation, as opposed to planting, involves collecting the larvae after the free-swimming stage and raising them to market size on artificially-prepared beds. Preparation of these beds involves covering the ocean bottom with clean shells to serve as attachment surfaces for the oyster larvae. (See companion article.) An average of 250 bushels of shells were spread per acre in the 1880s; now the average nears 2,000 bushels.

Aiding the productivity of the late 19th century were laws passed changing the status of offshore land.

In 1855 the Connecticut General Assembly passed the "two-acre-law," empowering coastal townships to grant two acres of underwater land per individual, provided the land did not infringe upon a natural oyster bed. The idea proved so successful the Assembly created a State Shellfish Commission in 1881 with the authority to grant perpetual franchises on designated oyster grounds. Time and experience led the commission to adopt the leasing policies now administered by the State Aquaculture Division.

In their approach to oyster cultivation, Long Island Oyster Farms, Inc., one of only two large-scale commercial companies in the Northeast, illustrates the mingling of old ways and new in the oyster industry today. Long Island Oyster Farms, Inc., a descendent of the F. Mansfield Company, founded around 1840, is really two businesses under one name. Each represents a different method of cultivation. A company brochure advertises: "Long Island Oyster Farms utilizes two methods to bring you quality oysters: A cultured hatchery produced oyster and a natural oyster scientifically farmed."

At their Connecticut outlet in New Haven, located along "Oyster Row" on the banks of the Quinnipiac River, oyster seed is raised and transplanted using time-honored techniques dating back to the early 1900s. Because the river and Long Island Sound are classified by the State Health Department as polluted waters, oysters grown there must then be shipped to the company's Long Island plant in Greenport where they are purified in clean waters and packaged for shipment.

The tradition of the New Haven operation contrasts with the technology of the Northport Hatchery run by Long Island Oyster Farms on Long Island. Here oysters selected for physical uniformity and disease resistance are placed in incubated tanks where manipulation of the tank temperature stimulates spawning. The larvae produced in these tanks are then placed in glass jars and fed algae. After six weeks of this royal treatment, the oysters are suspended in a warm lagoon heated by water discharged by the Long Island Light Company. Larvae grown under these conditions develop singly rather than in large clumps as they do when grown naturally. Single oysters are preferred for their easy packaging and uniformity.

Despite the fact that hatchery techniques reduce the oyster's maturation time from approximately four and a half years to two and a half years, the hatchery oysters, according to New Haven Manager Charlie Johnson, are used mostly as a reserve supply in the event that the harvest of naturally grown oysters cannot satisfy the demand. The expense of running the hatchery outruns the profit its oysters bring in the market. There are other problems as well. "Though the hatchery uses proven processes, too many factors can enter into production to make it one hundred percent successful," said Johnson. Among the potential problems are bacteria in incoming sea water and also overproduction of natural algae. The hatchery is maintained as a complement to the New Haven enterprise, which forms the backbone of the company.

Scientific methods are not reserved to the Northport Hatchery however. The New Haven branch uses water and oyster larvae sampling procedures throughout the breeding season. Scott Barnes, the staff biologist, routinely checks five stations for algae and larvae to determine the amount of nutrients in the water and the estimated size of the oyster crop. The number of larvae Barnes finds attached to suspended oyster shells is used as an indicator of the size of the harvest four to five years down the road. "My job is sort of like keeping inventory," said Barnes. "I keep the company posted on the age and number of oysters in each area so they can plan ahead." In the fall bushels of shells from each bed will be analyzed for the number of spat they carry, a more accurate estimate of the future harvest.

The Northport Hatchery and Barnes's sampling activities exemplify the application of science in a few areas of today's oyster industry. There are other areas of the industry, however, that science has failed to reach. Starfish predation control is one of them. This is not to say modern technology couldn't improve traditional control methods, just that it hasn't.

At 7:00 a.m. each morning, five days a week, Captain Tommy Piatkowski steers the 71 foot "Mascot" down the Quinnipiac River and into Long Island Sound. There, according to the lots he is assigned that day, Piatkowski and his deckhand, usually Ted Gourd, mop for starfish, trailing the huge chains of twisted yarn in a zig-zag pattern across the lot. The "Mascot," one of two Long Island Oyster Farms "star" boats that ply the waters year-round, was built in 1905 as an oyster dredge boat. About 30 years later starfish mopping was invented and the boat was converted. Despite the fact that the wet mops are barely supported by the ship's elaborate pulley system, they are still too buoyant underwater to entangle many starfish. "The mops pass over dozens of starfish for every one they catch," said Piatkowski. "The uptake is even less if the weather's bad or the bottom is rocky," he continued.

Yet mopping seems to be the only way to catch the starfish without disturbing the oysters. Starfish are the oyster's most serious predator. One "star," as oyster fishermen call them, can consume six full-grown oysters a week. "A starfish can go through set (baby oysters) like popcorn," said Piatkowski. The other alternative, the spreading of lime, is used only to eradicate a starfish infestation. Though far more effective, it is too expensive to be used on a regular basis. Handpicking the starfish is also too expensive in addition to being extremely time-consuming.

But the inefficiency of the mops doesn't disturb Piatkowski and Gourd, who look forward to any novelty to break up the mopping routine. Each day is different, they say. If it isn't scuba diving to check for starfish, it's the weather, or the place they're mopping, or maybe some disaster like the capsizing of two oyster boats that took place earlier this year.

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Violets in variety..

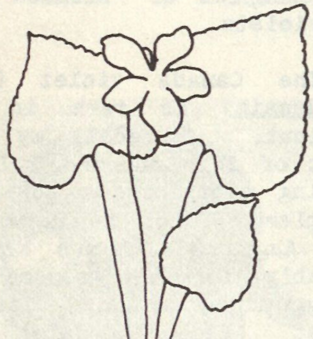
Eighty U.S. species are constantly cross-breeding

By G. Winston Carter

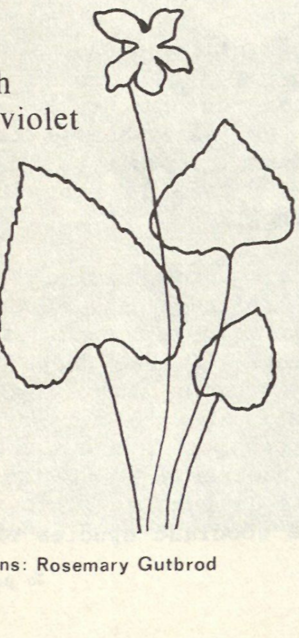
Most people are able to recognize the modest violet which is often part of the array of early spring flowers. They are found in a variety of habitats. Perhaps less notable than their familiarity as a flower is their tremendous diversity in color and parts. Many of these differences are a part of the charm of this appealing group of flowers.

Violet, over time, has become a word for a color. This is something that it has in common with the rose. However, not all violets are violet. They may be white, cream, yellow, purple, many shades of blue, and even green-brown.

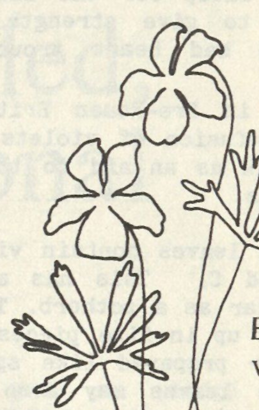
These flowers are constantly cross-breeding in the wild so that more and more variations continue to appear everywhere throughout our woods. Some violets give off an odor, others do not. Their variety seems endless. There are 300 species worldwide. Eighty species grow in the United States. Some of the well known cultivated forms are the pansy and Johnny-jump-up (Viola tricolor). This species is well named because it often escapes from cultivation and pops up on lawns and fields.



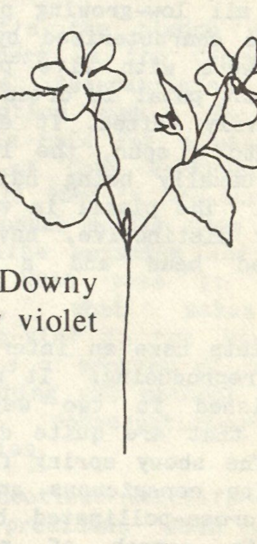
Common blue violet



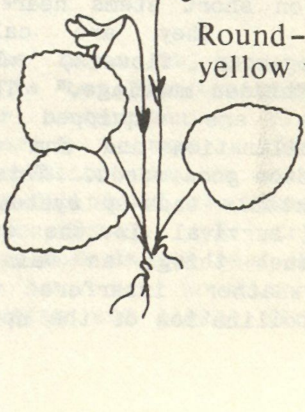
Marsh blue violet



Birdfoot violet



Downy yellow violet



Round-leaved yellow violet

Illustrations: Rosemary Gutbrod

A Greek legend states that Zeus created the violet as a special food with a sweet smelling aroma for Io, daughter of the river god Inarchus. Io is the Greek word for "violet."

Down through history, violets have had a number of significant uses, culinary and medicinal. During the days of ancient Greece, a violet concoction was used as a method of producing sleep for the insomniac and to give strength to those who had heart trouble.

Women in Pre-Roman Britain made an infusion of violets in goat's milk as an aid to their complexions.

Violet leaves contain vitamins A and C. This has made them popular as a potherb. They may be cut up in fine pieces as a salad or prepared like spinach. The leaves may also be used to thicken soups. Flowers of the violet can be candied, or they may be used to prepare jams, jelly, or syrup.

Members of the violet family are all low-growing plants. They are characterized by having flowers with five petals. The lowest petal is often wider and heavily veined. It extends back into a spur, the lateral petals usually being hairy or bearded. The pistil in violets is very distinctive, having a thickened head and a short beak.

Violets have an interesting way of reproducing. It may be accomplished in two ways by flowers that are quite different. The showy spring flowers are quite conspicuous and are easily cross-pollinated by insects in search of nectar. During the summer months, petal-less, closed flowers are borne on short stems near the ground. They are called cleistogamous flowers, which means "hidden marriage." These flowers are equipped for self-pollination and are able to produce good seeds. This is a remarkable back-up system to assure survival in the event that such things as rain or cold weather interfere with cross-pollination of the spring flowers. With the assistance of insects, nearly all species are able to hybridize easily. The violet may be a hybrid of a hybrid. This means that the traits of four species of violets could be involved.

The eager lover of violets may be able to discover albinos. One familiar type is the Confederate violet which is white with a blue center.

Violets look like small pansies. There are two general types based on the absence or presence of a stem. Stemless violets have leaves and flowers which arise on separate stalks while the other type, the "stemmed" violet, has an erect stem which bears both leaves and flowers.

The species of violet that we are apt to see most often is the common blue violet (Viola papilionacea). This violet has two lateral petals which are bearded. This is a common characteristic in violets and means the presence of a small tuft of hair. The lower petals are longer and are unbearded. All of the lower petals are strongly veined. This is an example of a violet which has stemless flowers and leaves on separate stalks. It is often found in dooryards and damp woods and meadows.

The marsh blue violet (Viola cucullata) at first glance might be confused with the common blue violet, but on closer inspection -- a hand lens will be helpful here -- there will be differences. The lateral petals will be darker toward the throat, and the beards will have little clubs or knobs on the end of each hair. Another difference will be that the lower petal is shorter. The flower stalks are longer than the leaf stalk. This violet is found usually in wet meadows, bogs, and springs.

The leaves of the birdfoot violet (Viola pedata) are quite different from other common violets. They are deeply segmented. The flowers may vary. One variety is bicolored, the upper two petals being deep violet and the three lower ones pale; another is uniformly colored. The upper petals are bent backward, and all of the petals are beardless. The tips of the orange stamens protrude noticeably. This violet prefers sandy soil, slopes, and sunny rocky areas.

The round-leaved yellow violet (Viola rotundifolia) is the only "stemless" yellow violet that we have blooming in the spring. It has small roundish leaves with scalloped teeth, and it grows close to the ground. The flowers expand with the leaves as they appear in the spring. They are usually found in rich woods. The downy yellow violet (Viola pubescens) and the smooth yellow violet (Viola pensylvanica) are examples of "stemmed" yellow violets.

The Canada violet (Viola canadensis) is rare in Connecticut. I recall my first sight of this charmer. It was growing along the roadside in Smugglers' Notch in Vermont in late August. It was blooming probably for the second time during that season. Birdfoot violet (Viola pedata) also blooms again in the fall on occasion. The Canada violet is characterized by the yellowish base of the petals and the purplish hue on the back of the petals. The stems are purplish with scattered hairs. Its leaves and flowers are on the same stalk. This violet is found in cool, moist rich woods, on wooded slopes, and in shaded ravines.

The northern white violet (Viola pallens) is a small stemless violet with nearly round or heart-shaped leaves. Its seed capsule is green. Look for them in wet woods or clearings.

The sweet white violet (Viola blanda) is similar to the last species but is more fragrant. It has deeper lobes at the base of the leaves, and it has a stem that is reddish. The upper petals are narrow and bent backwards, and the seed capsule is purple. This is one of the woodland species of violets.

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Conservation Camp: fun-filled, educational

I give my pledge as an American to save and faithfully to defend from waste the natural resources of my country, its soil and minerals, its forests, waters, and wildlife.

That's the pledge recited by campers at the Connecticut Wildlife Federation's Junior Conservation Camp. The camp, which is held for a week each August at Camp Workcoeman on West Hill Pond in New Hartford, offers usual summer camp activities like swimming and boating. What sets it apart, however, what makes it one-of-a-kind in the State in fact, is a program of hunting and fishing and outdoor sports and conservation-oriented activities.

Connecticut Wildlife Federation president John Reilly says the camp is "probably in fact the single most important thing we do throughout the year."

The major object of the camp is to give the boys "a better understanding of the outdoors," says Reilly. "Conservation camp is meant to be fun-filled but also meant to be educational. We try to educate them in the best way we know how on treating and respecting and caring for all the resources of not only Connecticut but of the whole country."

Above, Don Mysling (right foreground), maintainer, and Lynn Werner (center), research assistant, from DEP's Fisheries Bureau, get help from Junior Conservation Campers as they pull in a net full of pond species. After the pond fish identification session, below, a group of boys help Mysling pull in the boat.

Courses such as the one given the boys by Remington Firearms, for example, "teach the boys how to behave in the woods, things like safe gun handling and not to litter, and so on. During the week we try to give them a good overall general idea of what's available in the out-of-doors -- from hunting and fishing to trapping and canoeing."

Many of the 12- to 14-year-old campers come to the camp courtesy either of one of the Connecticut Wildlife Federation's 20 member sportmen's clubs or of other rod and gun or fish and game clubs. Reilly guesses that 40 to 45 clubs are involved as sponsors each summer -- sponsoring anywhere from a single boy to as many as five, as does the Wallingford Rod and Gun Club each year.

"We push it through the fish and game clubs and rod and gun clubs," he says, "because we've got to educate the youngsters. And the kids of those who hunt and fish will probably be out there themselves in a few years hunting and fishing and experiencing the out-of-doors."

A club sponsor is not required, however. Junior Conservation Camp is open to any 12- to 14-year-old boy interested in the out-of-doors. Last year 84 boys attended. In 1983 Reilly expects about 100.

A basic camp staff, including the director and his assistant, counselors, nurse, cook, and so forth, stay on after the Boy Scout camping season at Camp Workcoeman, which belongs to the Boy Scouts. But the specialized Conservation Education program is the work of the Connecticut Wildlife Federation.

CWF's Junior Conservation Camp program director, Ron Donath, is responsible for this part of the week at the camp. Prior to the actual camp, says Reilly, who served himself as a program coordinator for two years, two CWF program coordinators are responsible for making Conservation Camp what it's supposed to be. They are the ones who fill the week with field trips, guest speakers, demonstrations, and outdoor activities. This year past CWF president Fred Becker is sharing the responsibilities with Carolyn Molinaro, CWF's one paid staff member.

Earlier years' programs have included sessions on rifles and muzzle loaders, target shooting, trapping, bow hunting, fishing, fly casting, fish biology, fly tying, wildlife biology, forestry, forest fire control, and conservation.

Field trips have taken campers on tours of DEP's Burlington Hatchery and a tree farm, to a sporting dog demonstration and on river canoe trips. They've also done bird banding with Connecticut Audubon.

The 1983 camp will include sufficient hours of hunter safety and marksmanship in-

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Illustrations: Penni Sharp

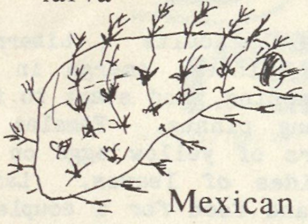
Nature Notes:

By Penni Sharp

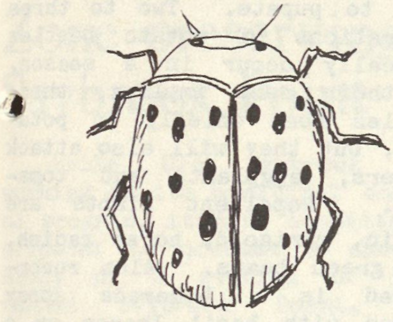
Doing what comes naturaly

To control unwelcome visitors to your garden

larva



Mexican bean beetle

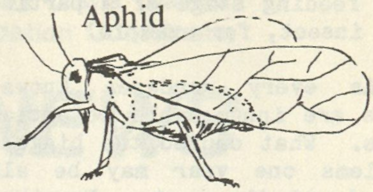


Epilachna varivestis

Colorado potato beetle

Leptinotarsa decimlinedta

Aphid



The month of May is a busy one for all those who enjoy gardening as a pastime. Seedlings, started indoors, can be transplanted into the garden, perennials divided, and shrubs and trees pruned. It is an ideal time to be outdoors: one can enjoy the spring season to the fullest before the heat of the summer sets in.

The cultivation of flowers and vegetables, always a popular pursuit, continues to be a source of endless pleasure to those who have become addicted to the hobby. As spring approaches, conversations where those who garden are present may include topics such as the yield of sugar snap peas, the advantages of rear-tined tillers, and the virtues of bone meal and cow manure.

Gardening is enjoyed by so many that a number of Connecticut towns and cities have established community gardens so that apartment dwellers can have their own plots to tend.

How gratifying it is to bring to the table healthy fresh vegetables picked minutes before. Nothing tastes quite so good as something cared for and grown in the home garden. Not only does one have the distinct advantage of being able to select what crops to plant, but, perhaps even more important, one is free to choose how to grow things. As we become increasingly aware of the often harmful side effects that accompany the use of chemical fertilizers and insecticides, alternative methods seem preferable.

Organic gardening is the broad term that applies to growing things naturally without the use of chemicals. The goal of the organic gardener is to create and maintain a balance of life within the garden. Ideally, with a proper balance of beneficial parasites and predators, the number of garden pests can be kept to a minimum, thus the use of pesticides avoided. While organic methods will not rid the garden of all insect pests, certain strategies can help to keep plants healthy and relatively free of insects.

Healthy plants are better equipped to withstand infestations than those which lack vigor. Thus it is important to ensure that a proper balance of nutrients is available to plants. Plants need nitrogen, which is best provided slowly by means of natural fertilizers.

Another practice that helps to protect plants from damaging insects is to avoid planting row upon row of the same crops. A better choice is to mix different plant groupings together. Many gardeners find mixed plantings to be more aesthetically pleasing as well. Companion planting, or growing an insect-repellent plant adjacent to that insect's preferred food, works quite well in discouraging many plant pests.

For successful control of garden pests, perhaps the most important thing is accurate identification and knowledge of the particular pest with which one is dealing. An understanding of its life cycle and habits can be very important. Plantings can be timed so that they are out of sync with the peak feeding stage of a particular insect, for example.

As every gardener knows, there are innumerable potential pests. What caused the biggest problems one year may be all but absent the next. Nonetheless, there seem to be certain "regulars" that turn up year after year.

For example, aphids of one kind or another are certain to appear in the garden. Aphids are small, soft-bodied insects that suck the juices of plants. They come in a full range of colors and can produce dozens of generations in a single growing season. Aphids can become numerous enough to cause serious infestations due to their ability to reproduce parthenogenetically (i.e. without fertilization). When aphid populations explode, the host plants lose vigor and have reduced yields. Aphids also act as the vectors of certain viral diseases. Several plants including garlic, chives, petunias, and nasturtiums can be interplanted with crops to repel aphids.

A spray of home-brewed rhubarb leaf tea or larkspur tea may also be effective. Lady beetles prey upon aphids as do lacewings. Some gardeners have had success in trapping aphids in yellow plastic dishpans filled with soapy water. Most important in controlling aphids is to keep up with, or rather stay ahead of, their burgeoning populations!

Anyone who has grown brassicas (members of the cabbage family) has undoubtedly encountered the imported cabbage worm. Not really a worm, this pest is the larva of the common white cabbage butterfly. Cabbage worms overwinter as pupae and emerge in the spring as white butterflies marked with three or four dark spots on each wing. The butterflies mate, then lay eggs which in turn hatch into bright green larvae. It is the larval stage which feeds on garden plants, concentrating on members of the cabbage family. The presence of large holes in the leaves of your broccoli or cauliflower is probably a sign of cabbage worms, which can be very difficult to see against a green leaf. Tansy and rosemary seem to aid in repelling them; cabbage worms also avoid tomatoes. Bacillus thuringiensis, marketed as a spray under several trade names, is a bacterial agent that is toxic to moth and butterfly larvae, yet safe to use on crops. It is certainly effective against the cabbage worm, however, it may also eliminate beneficial, non-target butterfly and moth larvae. If cabbage worms cause serious problems, you might try experimenting with homemade sprays. A mixture of soap and water spiked with mint, garlic, hot peppers, and onions is one concoction said to be effective. Less trouble and also reputed to produce the desired results is a mixture of salt and flour which can be dusted directly on the plants.

Another larva that can damage garden plants is the tomato hornworm. This distinctive caterpillar can reach a length of four inches. It is bright green and has diagonal white stripes on its sides and a horn or spine on its back end. The larvae attack members of the Solanaceae, or potato, family, which includes tomatoes, tobacco, eggplant, peppers, and potatoes.

The adult is a large sphinx moth that resembles a hummingbird and feeds on nectar from tubular flowers. Tomato hornworms are easily removed from plants by hand. The brachonid wasp preys upon the larva by laying eggs on the hornworm's back. If you spot a large green caterpillar infested with small white eggs, it is best to leave it alone and allow the wasps to mature as they are the best natural control of this pest.

A number of beetles are common garden pests. Among them, the Colorado potato beetle is one of the most widespread. The adult beetle is yellow with thin black lines running lengthwise down the wing covers. The larva is a small red grub with two rows of black dots along each side.

The adults hibernate through winter, emerge in the early spring, and start to feed on young plants. Females lay clusters of yellow eggs on the undersides of leaves. Larvae hatch and feed for a couple of weeks before burrowing into the soil to pupate. Two to three generations of potato beetles typically occur in a season. As their name implies, these beetles feed chiefly on potatoes, but they will also attack peppers, eggplant, and tomatoes. Repellent plants are garlic, marigold, horse radish, and green beans. Also recommended is a homemade spray brewed with basil leaves or a dusting with wheat bran.

The Mexican bean beetle is another common pest. A member of the lady beetle group, it is one of the few that is not beneficial. Resembling other "lady bugs," the adult is red with eight black dots arranged on each wing cover. The larva is a strange looking yellow fuzzy creature that is covered with spines. The life cycle of the bean beetle is similar to that of the potato beetle in that adults hibernate during winter, awake in early spring, and begin feeding. Several generations during a growing season are possible in warm areas. Bean beetles infest nearly all varieties of beans. They begin feeding on the foliage, eating away at leaves until only the leaf skeleton remains. They will also attack the pods and stems.

The beetles can be picked off plants by hand, but this is fairly tedious work. Interplanting with savory, nasturtium, or garlic may help deter these beetles, and some gardeners have reported good results from using a spray made with turnips and corn oil!

Many garden pests attack plants not by feeding on foliage but by boring into the stems and tunneling around in the plant. Familiar to most gardeners in this category of

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coastal area management
71 capitol avenue hartford conn. 06106

By Diane Giampa,
Public Participation Coordinator

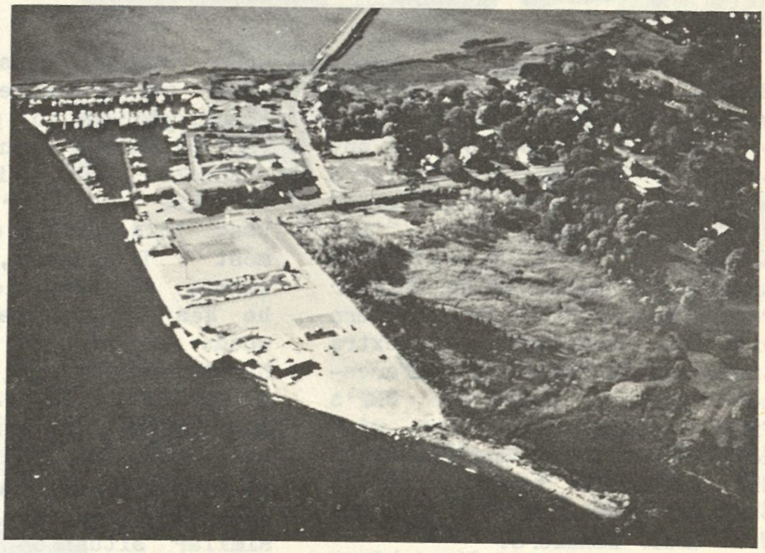
CAM NEWS

Zone preserving Saybrook Point

While Old Saybrook was working on its municipal coastal program, it also submitted a proposal to conduct a special study of a section of town called Saybrook Point, the peninsula that extends into the mouth of the Connecticut River between North and South Coves. Connecticut's Coastal Management Program, through a grant from the federal Office of Coastal Zone Management, provided limited funding last year for special studies that let the town take an in-depth look at a complex coastal issue that otherwise might be beyond the scope of its municipal coastal program. Local residents and planners felt that there are important resources, both natural and historic, on Saybrook Point that need to be considered when people plan the future development of the area.

Saybrook Point is the site of the earliest settlement in Connecticut. In 1682, explorers from the Dutch East India Company landed at the mouth of the Connecticut River, which had been named "Fresh Water" by the Indians and bought the land there from the Pequot Indian tribe. A few years later, however, a group of English gentry led by the Viscount Say and Seale and Lord Brooke settled in this same area which they called Saybrooke after their leaders. The group commissioned Lion Gardiner, a military engineer, to supervise the building of a fort to protect the point from possible reprisals from the Dutch.

Gardiner designed and built Fort Saybrook, and it soon became the center of the small settlement that was beginning to develop on Saybrook Point. He also designed Cypress Cemetery, the "Old Burying Ground" located on the south side of what is now College Street. Gardiner set aside this land in 1636 to be used as a graveyard for the first settlers in the area. Right next to the cemetery is the original location of Yale College. Although the school relocated to New Haven in 1716, it was founded in Saybrook in 1701.



Courtesy of Lane, Frenchman & Assocs. Inc.

A view of Saybrook Point looking south toward Long Island Sound.

The Fort Saybrook site contains fragile coastal wetlands, and the entire point is particularly vulnerable to flood damage during severe storms. The land has a relatively low elevation and lies close to the river; its proximity to Long Island Sound also makes it susceptible to the impact from unusually high wave activity during storms. Local citizens involved in the town's planning process recognized that the dangers of flooding had to be considered when establishing a new zoning system for the point.

They placed a very high priority on protecting and enhancing public access to the river as well as reserving key areas as undeveloped open space. The new plan needed to encourage water-dependent uses of the riverfront property and improve the flow of traffic in and out of the area during the crowded summer season. It also needed to have provisions for residential development.

Interested townspeople formed the Old Saybrook Study Committee, which included members of both the Planning and Zoning Commissions, members of the municipal staff, and a representative from the Fort Saybrook Association. Barbara Maynard, the town selectwoman, attended the special study meetings and provided important support to the project. The committee conducted public hearings and workshops, and as a result of months of study and

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Law Enforcement's gone to the dogs

For man tracking, evidence recovery, venison detection

Conservation Officer Joseph Balint takes a big part of his work home with him every night -- which is not to say that any of DEP's Conservation Officers have jobs they can forget after 35 or 40 hours a week. But Balint, of DEP's Eastern District, and Conservation Officer Peter Begley, of the Western District, have added an extra dimension to their law enforcement work. They are DEP's first officers to work with dogs -- and the "long noses of the law" who are their new partners spend 24 hours a day with their handlers.

Balint and Begley, with German shepherds Thunder and Vovk, took the Connecticut State Police Department's Canine Training Program and graduated in early January. The 14-week-long course began with basic obedience training and training in verbal and hand commands. The dogs also had to master the obstacle course at the Canine Training Center at the State Police Complex in Meriden.

Most of the remaining training took advantage of the dogs' natural sense of smell. They were trained in "man tracking" -- to prepare them for situations such as tracking suspects and finding lost persons. So far Balint has used this skill of Thunder's most frequently, locating owners of suspicious vehicles he has spotted parked in the woods -- persons who may be hunting or fishing or trapping illegally. In fact, Thunder led Balint to his first canine-assisted "bust," of an illegal trapper, as a result of just such tracking. And in a similar situation, Begley arrested a pair of deer poachers after Vovk located them in the woods. (Just the information that Vovk was coming to back track to the guns they had ditched led another pair of illegal hunters to giving up.)

"Evidence recovery" training taught the dogs to identify any item on which there's human scent -- meaning they'll alert their handlers to such an item in an area, whether it be a discarded weapon or clothing or beer cans or shotgun shells. "A dog," says Balint, "will find things a human search party will walk right over."

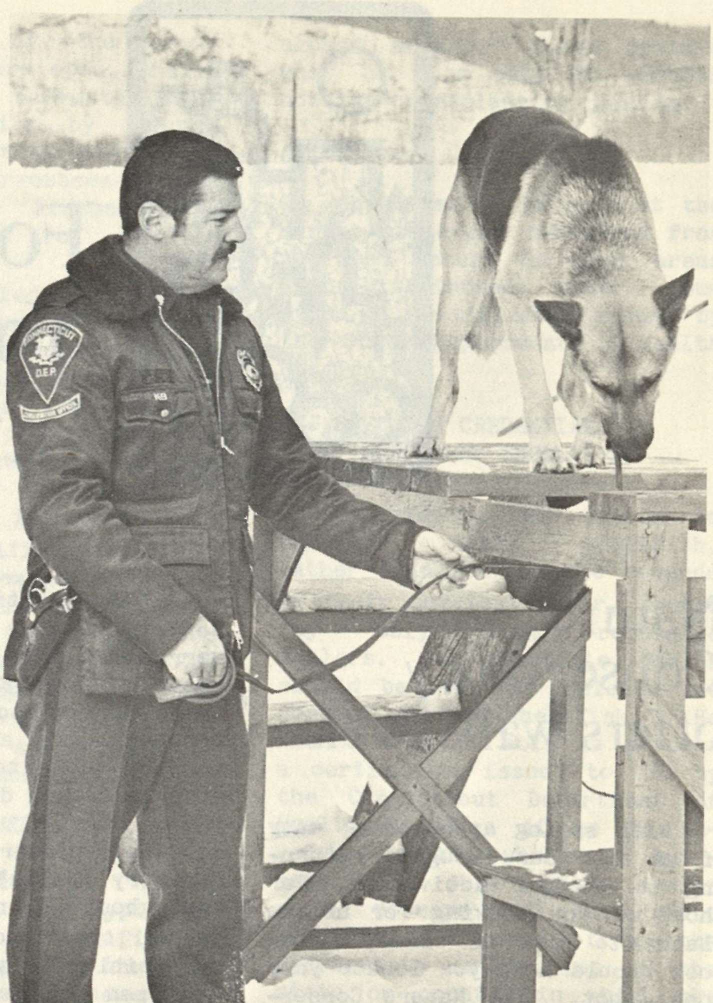
Thunder and Vovk and their fellow canines were also trained to do building searches and area searches. "The dogs," Balint says, "can find persons in a building in a few minutes where a search party might require an hour or more." The dogs are also trained to apprehend a fleeing suspect and to provide handler protection on command or if the officer is attacked.

At the end of their 14-week course, the 20 man-and-dog teams in Balint and Begley's course went through two days of testing on all these skills. Each team returns to the State Police Canine Training Center once a month for in-service training to maintain certification. DEP's dogs are also scheduled to return in April for a course in what the dog trainers call "venison tracking," where they'll learn to sniff out illegal game and fish.

All of the canine training courses's dog students are male

German shepherds, acccording to Officer Douglas Lancelot, who heads the State Police Canine Training Program. "We've found they're the best for police work -- they're agile, intelligent, adaptable. They can handle the weather."

In 1982, 27 officer and canine teams from various law enforcement agencies in the Northeast completed the training course under Lancelot and State Police Officers Andrew Rebmann and Horace Behrle. (The State Police Department has 25 canine teams of its own, including some which specialize in explosives and drug detection.)


Conservation Officer Joseph Balint and Thunder demonstrate some of the German shepherd's skills on the obstacle course at the state Police Canine Training Center in Meriden.

Not every German shepherd who begins the training turns out to be police material. The program washes out about 50 percent of the dogs that begin it, Lancelot said. They may not be aggressive enough or are gun shy or turn out not to be good trackers. If a dog flunks out of the 14-week program in mid-course, his officer gets a new dog and the challenge of catching him up to the rest of the class.

Since Balint's new partner goes home with him each night, one of the critical requirements in his and Begley's selection for the program was the willingness of their families to get involved -- which they have. During the off-season, to keep Thunder in practice as a tracker, for example, Balint's children went out every day and hid so he could trail them.

But it's not only the canine who's a trainee. And the demands on his handler are also high. While the dog is learning to obey, to scale walls and jump hurdles, to track, the officer is learning dog handling and canine psychology. And most important of all, Balint says, "You have to learn to have faith in your dog. When you're following six to 10 feet behind him, in the dark, tracking someone who may be armed, you'll have to trust your dog."

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For Your Information

By Leslie Bieber,
Citizens' Participation Coordinator

Nature Conservancy offers walk book

With spring approaching many of us find our thoughts returning to outdoor activities. For those of you looking for unique places to hike or canoe, a new book should help you locate your ideal spot. The Nature Conservancy and the Appalachian Mountain Club have combined forces to produce "Country Walks in Connecticut: A Guide to The Nature Conservancy Preserves."

The Nature Conservancy, which has protected nearly two million acres of ecologically significant land in this and other countries, has saved about 16 thousand acres in Connecticut. "Country Walks" highlights 20 walks and two canoe trips that one can take on The Nature Conservancy's natural area sanctuaries in the state. Other holdings of this organization are also briefly described. The entries are representative of the various landscapes typically found in the area.

Susan D. Cooley, who authored the guide, has used an informal approach to describe the preserves. The first section of the book covers the 22 major areas. Each one has a brief entry on trail length, topography, and landscape. Detailed directions to the preserve are also included. The narrative then discusses the natural significance of the area, its history, and how the property was acquired. Small maps of the site give the reader an orientation device.

The preserves listed in "Country Walks" are scattered throughout Connecticut and at least one should be easily accessible to you. Most areas are open for general use by the public, although a few require that you call the Nature Conservancy's Connecticut Chapter in Middletown for permission. Most of the trails described by Cooley appear to be relatively short and easy, a definite plus for out-of-shape hikers.

Overall, the book should be an excellent addition to the library of any local naturalist. The concise style, simple maps, and excellent photography compliment each other well. You can take an "armchair" trip through the beautiful natural areas of our state, or better yet, enjoy them first hand.

"Country Walks in Connecticut" may be available at your local bookstore. If not, copies can be ordered directly from The Nature Conservancy at P.O. Box MMM, Weslyan Station, Middletown, CT 06457. Cost is $8.47 for non-members of the Conservancy, $7.40 for members, which includes 7 1/2 percent sales tax and $1.00 postage and handling.

The publication of "Country Walks in Connecticut" was supported in part by grants to The Nature Conservancy from Ensworth Charitable Foundation Trust, Aetna Life and Casualty Company, and the Standard Oil Company of Ohio (SOHIO). ■

Dinosaur volunteers

Interested in educational skills; interested in nature? Then perhaps you would be interested in becoming a Volunteer Naturalist at Rocky Hill's Dinosaur State Park.

Each week interesting training programs will be presented by the park staff. They'll include lectures, slides, chalk talks, discussions, hikes, and field trips to museums, arboretums, and nature centers.

The regular lecture and discussion programs followed by half-hour outdoor walks will be held every Tuesday at 10:30 a.m.

Among the topics to date have been: early dinosaurs; an introduction to geology; sedimentary rock; "the work of streams"; and fossils. There have also been field trips to the Peabody Museum and to the Museum of Natural History.

Similar topics related to the park will be covered in future weekly sessions.

Call 529-8423 for additional information. ■

Safe shellfish

From page 2

ties unless otherwise posted by the towns.

OPEN OR CLOSED TO SHELLFISHING?

Areas are closed to shellfishing because the shellfish growing waters: (1) are located near sewage treatment plants; (2) are exposed to direct sewage discharges, chemical, or radiation contaminants; (3) have levels of coliform indicator organisms greater than 70 total coliforms per 100 milliliters (ml) or more than 10 percent of these samples have levels above 230 total coliforms/100ml. Oil spills, or high levels of paralytic shellfish poison in area shellfish may also necessitate the closing of areas. In Connecticut, major closures are usually the result of sewage treatment plant locations.

Areas closed to shellfishing range in size from a river mouth to an area encompassing several municipal boundaries. Shellfishing is prohibited in these areas by the State Department of Health Services as a result of sanitary surveys, float studies, and water sampling. Individual towns may have additional closure areas as well as ordinances requiring local permits for the harvesting of shellfish.

Connecticut has three conditional closure areas. These areas are open to shellfishing until the water quality deteriorates as measured by specific conditions (such as rainfall). The town would then close the area for a specified number of days as stated in the State-Town agreement governing the operation of the area. When the areas are open, shellfish may be harvested for direct consumption by recreational harvesters or for direct marketing by harvesters having the appropriate license from the Department of Health Services.

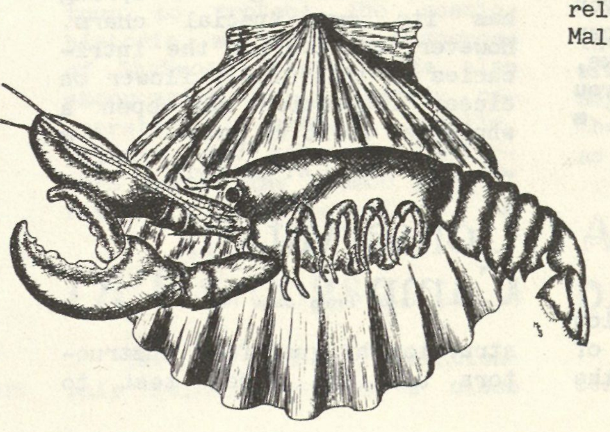
For a detailed description of "closed" areas in a particular town and license requirements, individuals should communicate with the local Director of Health. Shellfishing in a closed area without a special permit from the Department of Health Services is prohibited. Taking of shellfish for bait from a closed area is also prohibited, and no licenses may be obtained for this purpose. Enforcement is carried out by local police departments, and individuals convicted of illegal harvesting are subject to fines and jail sentences.

LICENSES

The Department of Health Services issues two types of commercial shellfishing licenses: permits for harvesting in closed areas, and certificates for harvesting from open areas and distribution.

CLOSED AREAS

Transplanting permits are issued to individuals with shellfish beds under their control. Under this permit, seed oysters may be purchased or shellfish harvested from specified closed areas and transplanted to specified beds in open areas for purification purposes. Seed oyster permits are issued to individuals to harvest oysters only from closed areas. These oysters must be sold only to persons holding transplanting permits.



OPEN AREAS

Shellfish to be sold at the market place are harvested from approved waters in open areas and distributed under four types of certificates issued by the State Department of Health Services.

CHECKING CREDENTIALS OF PURCHASED SHELLFISH

Individuals who decide to purchase their shellfish, rather than reaping the rewards of their physical labor, should buy only from reputable dealers. A reputable dealer should be able to indicate the source of his shellfish. He should also be able to produce a certificate issued to him by the Connecticut Department of Health Services if he is involved in the wholesale business. An out-of-state dealer must possess an interstate certificate issued from the appropriate authorities of the state or country in which the out-of-state dealer is based. A retailer or restaurant owner should be able to identify a supplier holding such a certificate by means of shipping tags. If customers have any questions concerning product safety, they should contact their local health department.

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This is an excerpt from "Were the Shellfish You Just Ate Safe," Connecticut Health Bulletin, Vol. 96, No. 4, 1982. For more information on shellfish area closings and related matters, contact Malcolm Shute at 566-3110. ■

Aquaculture

From page 7

In an effort to keep closer tabs on shellfishing companies, the Health Department has written a new regulation effective October 1, 1982. The regulation stipulates that commercial businesses or individuals with Health Department permits to harvest shellfish from closed areas and transfer them to open waters must notify the local police department as to when they start harvesting and when they intend to stop. This should decrease the risk of contaminated shellfish being sold for consumption before being depurated in clean water or sampled by the Health Department.

All the expertise devoted to our commericial shellfishing industry does not detract from the region's recreational shellfishing opportunities. Considerable effort is made by coastal townships and by the State to accommodate the needs of the shellfisherman who's content to fill his or her basket with scallops or clams and head home. The towns of Old Saybrook, Madison, Clinton, and Guilford, for instance, work with the Aquaculture Division to transplant shellfish from polluted waters to clean waters where the recreational fisherman can harvest them.

If you're in the mood for seafood and would like to try playing shellfisherman for your family and friends, decide where you'd like to fish and then contact the town clerk of that particular municipality. He or she will be able to give you a shellfishing license or tell you where you can get one and will also give you information on where you can fish, how much you can take, and other regulations that you may not be aware of. ■

Oysters don't change

From page 10

When things get slow Piatkowski reminds himself of the hours he worked aboard the "J.R. Nelson," a Long Island Oyster Farms boat in charge of transplanting beds, spreading cultch, and harvesting the oysters. Long hours aboard the "J.R. Nelson" turn into 18 hour shifts during transplanting time because the crew is continually crossing the Sound as they transfer New Haven oysters to the certified waters off Greenport. "All I knew was that boat and that crew," said Piatkowski. "Now I've built up a social life and grown used to the free time, I couldn't go back. But it was a great four years."

Time really does seem to stop out there in the middle of the Sound. Turn your head from the smokestacks of New Haven and you can imagine what oyster fishing was like over a hundred years ago. Back at the hatchery, thousands of oysters are being produced through scientifically proven techniques. But out on the water it's easy to believe that nothing has changed. ■

Various violets

From page 12

The green violet (Hybanthus concolor) is a plant that would never be suspected of being a violet except for the club-like pistil. This is a distinctive characteristic of the violet family. The flowers are small, green, and they drop singly from the axils of the leaf. This rather coarse looking plant is found in rich woods and bottomland. It is found in Connecticut but is considered rare, probably because it is at the northern limit of its range.

Coming upon a clump of violets as a harbinger of spring has its own special charm. However, discovering the intricacies of this lovely flower on closer inspection may open a whole new world to you. ■

c 1983 Gale W. Carter

Conservation Camp

From page 14

struction by qualified instructors and the final test to enable boys to qualify for their Hunter Safety Certificates.

Volunteer instructors come from many of the State's hunting and fishing clubs as well as from Connecticut Audubon, the Farmington River Watershed Association, Remington Firearms, and the Shooting Sports Foundation. The Department of Environmental Protection has been well represented with programs involving Conservation Officers and staff members from the Wildlife, Fisheries, and Forestry bureaus.

Organizations interested in sponsoring campers can contact the Connecticut Wildlife Federation (27 Washington Street, Middletown, CT 06457; (203) 347-1291) and request "Junior Conservation Camp Application Form." Interested individuals can also request the form: cost for the week per camper this year will be $130, including insurance and transportation for field trips. Dates for 1983 are August 14-20.

Persons interested in working as counselors or junior counselors or willing to serve as instructors should also contact CWF, Reilly says.

The federation has been attempting to set up a similar Junior Conservation Camp for girls, but as of the 1983 season they have not yet been successful.

From a camper's point of view, will it all be fun? As proof of the camp's success, Reilly cites the campers' most frequent complaints when he asks each year how they liked the camp. "Not enough fish in the lake" comes in ahead of "No girls." ■

Bug control, nature's way

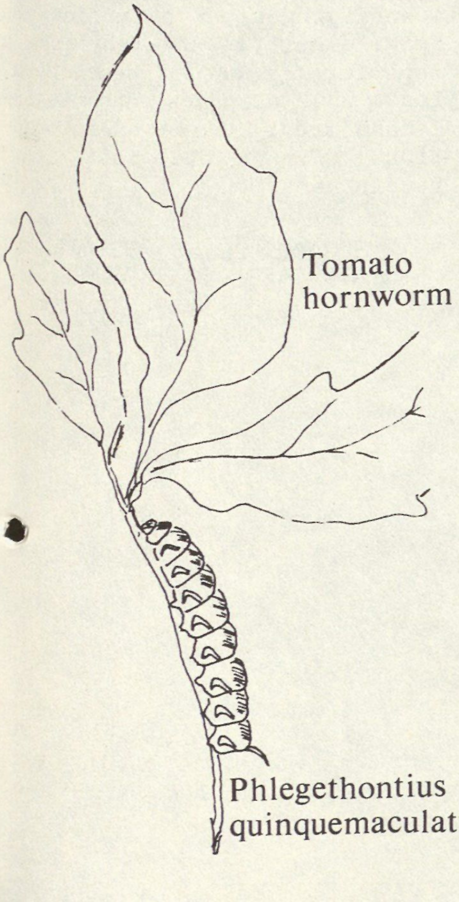
From page 16

pests is the squash vine borer. The vine borer is a white caterpillar approximately one inch long with a brown head and brownish legs. The adult is a moth with clear wings and an orange and black abdomen.

Squash vine borers spend the winter in silken cocoons beneath the soil. Adults lay their eggs at the base of plants and the larvae, when hatched, burrow into stems. They attack most cucurbits, members of the pumpkin family. A sudden wilting of the plant may signify the presence of borers which may otherwise be difficult to detect. Look for tell-tale sawdust-like deposits around the stems of squash plants, another sign of the borer's presence. Those not too squeamish should carefully slit the stems of affected plants and remove the larvae.

Planting either early or late to avoid the feeding peak may also help in avoiding damage by squash vine borers.

These are a few suggestions that may be useful to those looking for alternative ways to protect their crops from damage. Perhaps you have some special strategies of your own that have proven effective. Many solutions seem quite creative, and you might like to try concocting a "brew" of your own for ridding your garden of pests. It is wise to bear in mind, however, that small numbers of insects, even those regarded as nuisance animals, can probably be tolerated by your plants. A good rule of thumb is that if the plant can tolerate the pest, then your best choice may be to leave things as they are. ■



Tomato hornworm

Phlegethontius quinquemaculatus

Saybrook Point

From page 17

discussion a three-part zoning district evolved as the best way to handle the unique development issues on Saybrook Point. At the end of this past January, the town's Zoning Commission voted unanimously to adopt the new district into its zoning regulations.

The first of the three sub-areas contains the Fort Saybrook site, and the zone will allow it to remain as a passive recreational park. The use of this 17-acre parcel of land will not be changed, but access to the river will be improved. The second sub-area is a waterfront section of land that will emphasize water-dependent and water-related activities, such as marinas, boat stores, recreational fishing piers, and marine research laboratories. By special exception, however, the Zoning Commission may also allow restaurants, offices, stores, hotels and motels, and government buildings. The third sub-area, which is not waterfront property, is located in an established residential neighborhood. The plan will allow additional residential dwellings to be built, but it will no longer allow commercial development in this area.

This three-part zoning district is a unique way for the town to protect the scenic, historic, and natural resources of Saybrook Point, while also encouraging the necessary cooperation among public, private, and commercial interests toward the common goal of revitalizing the waterfront. ■

DEP's dogs

From page 19

The man and dog relationship quickly becomes a close one. "If he'd flunked out, I'd have two German shepherds at home now instead of just one." It's also sometimes a stress-filled one. "There were days I was sure he'd wash out," Balint says. "But the next day he'd get it right."

So, how do you tell a 70 to 100 pound German shepherd that you want him to scale a wall, to begin with a straightforward example of the things a police dog trainee needs to learn? "The first couple of times," says Balint, "a couple of the other handlers would just hoist him over and his own handler would pet him up on the other side to express his approval."

Instructing a police dog in the subtleties of police work requires that the handler maintain control while not confusing or discouraging the dog. Even now the well-schooled Thunder occasionally will pretend not to hear a command. Lancelot was called for help during the first week "out of school" after Thunder's class when one of the other dogs, in something of an excess of enthusiasm for duty, would not let any other persons into his officer's car.

All in all, says Robert Buyak, Assistant Director of DEP's Law Enforcement Bureau, "The dogs think it's all one big game." For the human member of the team, however, it's not all fun and games: "He's got to be dedicated. He's got to go back and constantly work with the dog to keep him sharp. In the off-season he has to create artificial circumstances to keep the dog in tune to what he's supposed to be doing."

"Using the dogs increases the Conservation Officer's efficiency and saves him time," says Buyak. "And I expect their use will be more creative as we use the dogs more." ■

Audubon helps protect wildlife

The Audubon Wildlife Advisory Committee of the National

Audubon Society Connecticut network has announced two new projects to help protect Connecticut wildlife populations.

After the first year of its five-year-long Breeding Bird Survey, which it calls "the most significant ornithological research project ever undertaken in the State of Connecticut," Audubon has announced plans to protect the only large tern colony in Connecticut as well as a plan to survey critical habitat areas in the State in conjunction with the Breeding Bird Atlas study.

Marshal Case, Northeast vice-president of National Audubon Society, also announced the opening of an office in Hartford to better address Connecticut wildlife issues. Working in 15 local chapters and three affiliated groups around the State, the 16,000 National Audubon Society members in Connecticut hope to have an increasing impact on government and to foster a coordinated effort to protect all wildlife species.

National Audubon has joined forces with Little Harbor Laboratory, Inc., of Guilford, to protect Connecticut's declining tern populations. Wardens will patrol Falkner Island, off the Guilford coast, all summer and a team of researchers will collect information for a data base. Along with Little Harbor Association, New Haven Bird Club members will provide financial support and volunteer manpower.

Falkner Island has the only large tern colony (1,800 or more pairs in 1981) in Connecticut and the third or fourth largest breeding population of Roseate terns (190 pairs in 1981; 130 pairs in 1982) in this region. The Roseate tern is currently under consideration for listing as a "threatened" or "endangered" species, and populations of both Roseate and common terns appear to be declining.

Habitat loss has a critical impact on bird species, and the newly inaugurated survey of critical habitat areas will address that issue. The project will include the development of critical and unique area guidelines and, using the existing network of persons involved in the Breeding Bird Atlas, will identify habitat areas and explore options for protection of important areas.

Volunteers interested in participating in the Breeding Bird Atlas program are still needed for all aspects of the project. For information, contact David Rosgen, State Coordinator, at Northeast Audubon Center, R.R.1, Box 171, Sharon, CT 06069; (203) 364-0520.

Educational programs are available to organizations interested in participating. New atlasers will be instructed in the finer points of field work, from identification and habitat suitability to nesting periods and birding considerations.

Modeled after studies conducted in Great Britain, Maryland, Massachusetts, New York, and Vermont, the Connecticut Breeding Bird Atlas Project is based on the U.S. Geological Survey quadrangle map grid system. There are one-hundred and sixteen 7 1/2 minute quadrangle maps which cover the State's 5,009 square miles. Each quadrangle has been divided into sixths. Each sixth represents a block about nine square miles in size. Each block is being surveyed for breeding species of birds. Each species found is classified as a possible, probable, or confirmed breeder according to strict field criteria. Eight reporting regions have been established, with a coordinator in each region.

When completed, the Atlas will be a record of the breeding distribution of all bird species nesting in Connecticut. Other goals include identifying areas of unique and fragile habitat and providing a tool for the use of developers, land use planners and legislators and a source of information for biologists and researchers. ■

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